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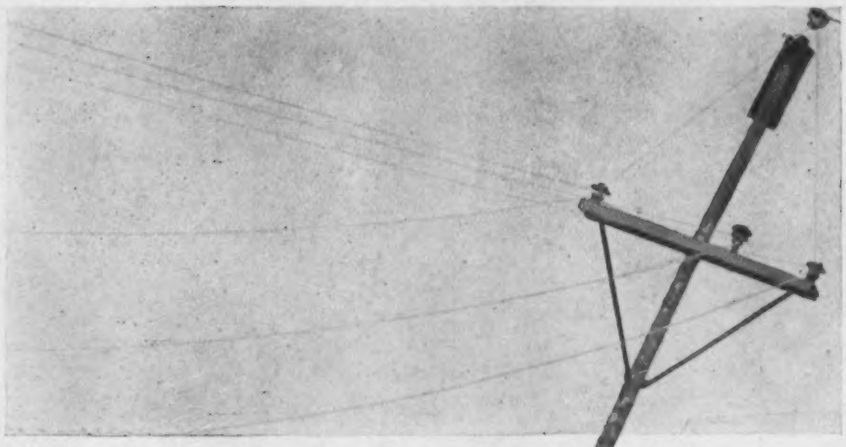

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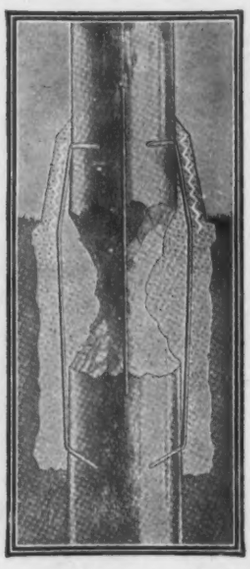

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VOLUME XXXII SAN FRANCISCO, JANUARY 10, 1914 NUMBER 2

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TRANSMISSION LINE CONSTRUCTION DIFFICULTIES

The story of the construction of the Vancouver Power Company's new steel tower transmission line is a further corroboration of the statement that water power sites are never given away; that considerable development is invariably essential, and that difficulties have to be met which would be discouraging to the average individual. But these projects are conceived by those real engineers, who are the prophets of accomplishment; they who uncover nature's most carefully guarded resources, and who then bend them to their will—the efficient service of the people. For them even the overshadowing barrier of the mountain does not baffle, but braces endeavor to its submission; it is tunnelled, traversed or removed.

"In places at water level and at others 500 ft. above Lake Buntzen."

The Vancouver Power Company is connected with the British Columbia Electric Railway Company, Ltd., Vancouver, British Columbia, and the Fraser Valley & Southern Railway Company, Ltd. The Vancouver Power Company generates and distributes the energy to the other concerns, which operate on the mainland of British Columbia, over a very extensive territory, including North Vancouver and suburbs on the north shore of Burrard Inlet, Vancouver, South Vancouver and a great number of smaller municipalities, and the connecting rural districts as far south as the United States border line, and east, approximately 100 miles to Chilliwack.

The Vancouver Power Company's system has heretofore been operating at 34,000 volts, transmitted over wooden pole lines, but with the installation of an additional 42,000 h.p. at the new No. 2 power house —which is situated a short distance from the first power house of this company, just below Lake Buntzen, on the north arm of Burrard Inlet—it was de-

cided to increase the line voltage to 60,000 volts, and to adopt steel towers wherever possible, in place of the former wooden poles. This is the second change made necessary within a few years on account of the rapid growth of the company.

"The overshadowing mountains do not baffle."

One section of steel tower line recently completed is seven miles in length and extends from No. 2 power house to Barnet, where the main transmission lines into Vancouver are strung across Burrard Inlet.

It will be noticed that in the construction of this line operations were started at sea level, and practically completed there also. But this is no indication of easy construction, for within the short distance of seven miles it was necessary to work up to and over an elevation of 2000 ft.—a condition not often encountered in line construction.

To further appreciate the difficulties overcome by the contracting engineer, Mr. Tully R. Cornick of Vancouver, B. C., who carried the work through to a successful issue, the characteristics of country traversed should also be considered.

To say that it is rocky or mountainous is not sufficient. The densely wooded, precipitous slopes are covered with fallen timber, and in other places a dense undergrowth makes travel difficult, if not impossible, while in the depressions muskegs are also encountered. Over these it is necessary to throw hastily constructed bridges in order to permit safe passage even to man. Pack horses mired in these, sometimes sink up to their bellies immediately, and are only extricated with great trouble.

It was next to impossible to discover a level space along the entire route sufficient in extent to permit assembling the towers which it was found necessary to construct in a vertical position. Camps had also to be pitched on rafts, which were built on both Deer Lake and Lake Buntzen.

Add to these difficulties the danger of erecting steel towers in close proximity to "hot" high tension lines and the magnitude of the task and the daring

"In the depressions muskegs are also encountered."

of the engineers who conceived it can be better imagined.

But with skill plus, all things are possible and accomplishment is recorded.

The transportation of material for this project occasioned great difficulty. Scows were employed for shipping all construction material from Vancouver to the power house on the north arm of Burrard Inlet. It was then carried up the steep mountain side to Lake Buntzen on an inclined railway built by the company for construction purposes. Then rafts were requisitioned and these, hauled by motor boat, conveyed the material across the lake. Here the greatest difficulties were encountered, for from the lake shore onward, with the exception of the Deer Lake stretch, pack trains and the sturdy limbs of the workmen were the only methods of transportation possible. The steel was carried by the workmen, and the cement, gravel, sand, and even the water for mixing the concrete, was packed in on horseback, South African water bags being used for this purpose. The train consisted of twenty-five horses all told. Several row boats and three gasoline launches were also utilized for lake transportation.

A pole line right of way is not to be confused with the easily traveled roadbed of a railway, and that of the Vancouver Power Company from the Lake Bunt-

"In close proximity to 'hot' high tension lines."

zen power house to Barnet, which is 100 ft. in width, is exceptionally rough. The old system consisted of two pole lines of two circuits each, the poles being located twenty-five feet from the center line of this 100 ft. right of way.

work in stringing the cables, as well as in tower construction.

In this section are sixty-three standard towers and two special. Of these last, one is at No. 2 power house and the other is to be located at the Barnet crossing. The first of these towers only has to date been erected. It weighs no less than five tons.

The tower foundations are of concrete, and these were poured and the anchor bolts placed before the tower material arrived on the ground. Wherever possible the tie rods were cement grouted into the solid rock. Preparation of the majority of the foundations was rendered extremely difficult on account of the proximity of the live lines, the necessity for the continued operation of which would not permit of blasting.

The towers are 62 ft. 6 in. in height from foundation level, and the lowest cable is 40 ft. 6 in. from the ground. A ⅜-in. steel wire, used on each tower for grounding purposes, is carried right up to the apex.

Two three phase circuits using No. 3/0 semi-hard drawn seven strand hemp core copper cables are used; the distance maintained between conductors being seven feet. Standard O. B. suspension insulators and hardware are used throughout.

From power house No. 2 at sea level to Lake Buntzen is a distance of only one-half mile, but the difference in elevation is no less than 500 ft.

A further idea of the ruggedness of the country can be gathered from the fact that the new transmission line, which follows the shore of Lake Buntzen for approximately three miles, is in places but a few

"Even the water for mixing concrete was packed on horseback."

It was the original intention to construct the steel towers right on the center line, but as the angles would be too great for safety, this idea was later abandoned as impracticable. The new line consequently crosses the old lines at several places, and at others is directly overhead, causing considerable close

feet above lake level, while at others it is as high as 500 ft. above it. This is due to the indented nature of the lake shore, along which are to be found at frequent intervals, high bluffs and crags.

From the southerly end of the lake the line rapidly reaches the highest altitude. "The Summit," a

mountain peak 2000 ft. above sea level. Here was poured on a precipitous bluff, the highest tower foundation. The foundation forms were over 12 ft. high on one side, while on the other, no more concrete was used than was necessary for levelling purposes, the two legs of the tower being fastened to solid rock.

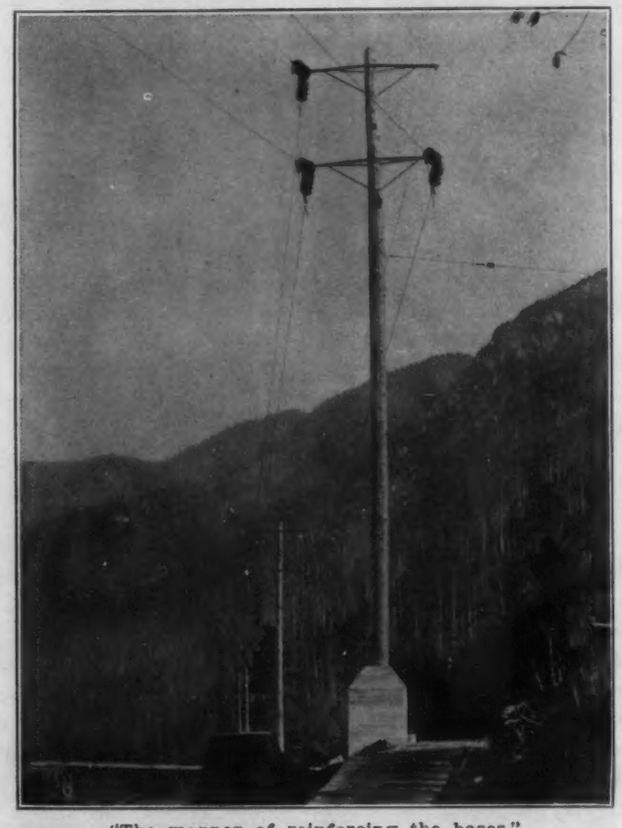
"The highest foundation.

From this point the line drops rapidly in its winding course to Barnet, passing Deer Lake, which is approximately 200 ft. above sea level, en route. This lake is ¾ of a mile in length and was used for the purpose of construction camps and transportation.

The Vancouver Power Company also built a three phase 60,000 volt wooden pole tie-line between power houses Nos. 1 and 2. This line, which is about 2300 ft. in length, also carries a ground wire which is also used as an equalizer. This line will be later replaced with a steel tower line and the present one used for two 2200 volt circuits and the necessary telephone wires.

The manner of re-inforcing the bases of the poles on this line merits explanation. The entire stretch of ground between the two power houses is solid rock with but a thin layer of earth over. In placing these poles a 2¼ in. hole 2 ft. deep was drilled out of the rock and a 2 in. hole bored in the butt of the pole. A 4 ft. length of 2 in. round iron was cement grouted into the rock and the pole set over this. Eight holes were also drilled into the rock around the pole to the same depth. In these re-inforcing iron rods ⅝ in. diameter were placed and allowed to stand 2 ft. 6 in. above the level of the rock. Molds were then built and concrete poured, which formed a solid block 3 ft. 6 in. square and 5 ft. in height.

Mr. T. R. Cornick, who undertook the entire work in connection with the construction of this steel tower line, handled, as field superintendent, the erection of the Mexican Light and Power Company's steel trans-



"The manner of reinforcing the bases."

mission lines (170 miles of direct transmission), under Mr. R. F. Hayward, now general manager Western Canada Power Company, and later erected all the ground wire masts and cable on the same line as an independent contractor. This work was accomplished within a closeness of 30 in. to 60,000 volt line cables. Coming to Vancouver at the inauguration of the development of the Western Canada Power Company's project at Stave Lake, Mr. Cornick built the entire steel tower high tension system for this company by independent contract work between the generating point at Stave Lake and Vancouver, a distance of 32 miles. The contract he has just lately completed forms the first section in the work of rebuilding the Vancouver Power Company's high tension lines between Lake Buntzen and Vancouver.

The next section to be undertaken will be the construction of a similar line from power house No. 1 to Port Moody, a line of about the same length as that here described and through a country in which equal difficulties will have to be overcome.

The national rivers and harbors congress at Washington, D. C., adopted resolutions recommending the creation of a department of public works with a cabinet official at its head; an annual rivers and harbors appropriation from congress of $50,000,000; the standardization of the depth of waterways; the making of laws compelling freer interchange of interstate traffic; prohibition of domination by railways of water traffic, and state or municipal ownership of water terminals.

WASTE DUE TO NON-USE OF WATER POWER

BY W. V. N. POWELSON.

(Concluded.)

Arguments Against a Limited Tenure.

The question of a limited tenure for the use of water power has been the subject of much controversy. Because I believe there is much merit in the arguments of those who affirm that it is against the true interest of the public to limit the tenure of sites granted to public service corporations, except for breach of contract, I will summarize as best I can their position.

A public service corporation created by the state and engaged in a work of internal improvement is quasi public in character and is entitled in many states to exercise the state's sovereign power of eminent domain. The generation and distribution of electricity to municipalities and the public generally is a public use, and an association organized as a public service corporation engaged in generating electricity by water power and offering it for sale to the public is in effect an agent of the state supplying a public use and as such is subject to the state's supervision and control.

Most states have by legislation provided the machinery to give effect to this right to supervise and control, and it should be conceded that those states that have not yet done so will not neglect much longer to give effect to those rights.

The state's sovereign power to supervise and control a public service corporation extends not only to the power to regulate and fix prices, but it extends to the character of the service and to every act which directly or indirectly influences the public welfare.

The business served by a public service corporation supplying electricity never ends its growth. It is, so far as experience teaches, continually growing and expanding.

In prosperous communities the annual requirements of such companies for new capital for improvements and extensions often largely exceeds the annual net earnings and at times exceeds the annual gross earnings, so that the ability of the company to give adequate service is dependent upon its ability to continually secure money for its extensions. If for any reason the credit of a company is impaired, its ability to make extensions is impaired, and to that extent its ability to adequately serve the public is impaired.

A public service corporation operating a water power under a limited tenure would not be able to raise money for extensions or improvements which it could not demonstrate would be returned, principal and interest, out of earnings prior to the limit of its tenure.

During each succeeding year of operation the sinking fund percentage on moneys expended for improvements during the year would have to be increased. This would necessitate an increase in price each year, which the state's right to control might not be able to prevent, because the state's right does not extend to a confiscation of property, and the prices may not be regulated below a point which would prevent the return to investors of the principal, with interest, at the expiration of the tenure period.

Prices would thus grow each year until they reached the limit of what the traffic would bear. Above this they could not go; so that when this limit was reached the demand for new capital for extensions would automatically cease and growth would end.

The community would thus be without adequate service and would be paying for such service as was rendered all the traffic would bear, with the further disadvantage of not being able to get any more service even at such a price.

At what stage in the tenure period this condition would occur would depend upon how cheaply the water power could produce electricity. If the cost was substantially equal to that by coal then this condition would be reached early in the tenure period. If the cost was lower, then this condition would be reached later.

To make clear why, after the water power is put in operation, there is need for such a constant supply of new capital, I may say that it is seldom that the initial expenditure at a water power site fully develops it. The initial expenditure is kept as small as possible consistent with the existing market. As new business is secured, further expenditures are necessary both at the hydroelectric plant and in added transmission facilities.

It is proper to include the cost of the transmission facilities in the amount to be amortized, because this is merely the body, in which the water power is the heart. If deprived of the heart's action, the body dies.

To properly perform its function to the public, a public service corporation should be able, indeed it should be required, to serve within its sphere every legitimate need of the public. If the public welfare requires that the corporation should enter into long-time or even perpetual contracts with its consumers, it should be under no legal disability to do so.

One case will illustrate the point. Many of the western power sites when developed will supply large quantities of power for irrigation to be used in pumping water on lands that can not be profitably irrigated by coal power. It is the experience that irrigation projects can not be financed unless the water right is perpetual and runs with the land. If this be true, then such irrigation projects as I have described can not be financed without a perpetual contract for power. Obviously a public service corporation may not make a contract for service beyond the limit of its tenure unless the state is obligated at such date to take over and assume the contract.

More could be said on this general subject of credits, prices, and service, but I think I have said sufficient to show the baneful influence upon the usefulness to the public of a public service corporation operating a water power under a limited tenure.

However expedient it may be considered to apply the principle of limited tenure to a water power built to serve a private use, I think we should, in view of the arguments just stated, gravely consider whether in the case of a public service corporation acting as the agent of the state the proposed requirement of a limited tenure should not be abandoned.

LIGHTING METHODS

SPACING OF LIGHT-UNITS.

BY THOMAS W. ROLPH.

(In this article is given a method for determining the proper spacing of light-units when their photometric curves are available. It will be found of great value to the practicing illuminating engineer.—The Editors.)

The degree of uniformity of illumination obtained in any lighting installation depends upon the spacing of the light-units. When several units are used to light an area it is desirable to arrange them in the form of squares or rectangles as nearly square as possible. The ratio of the length of one side of the square to the height of the light-unit above the horizontal plane on which illumination is desired, is the important factor in determining uniformity of illumination. This ratio

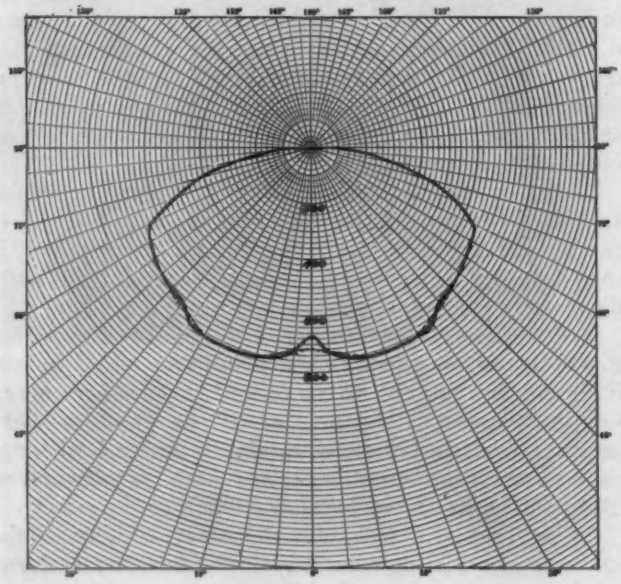


Fig. 1.

is usually referred to as k, and is called the spacing constant. With any given installation of light units if the distance apart and the height are varied in such a manner that k remains constant, the uniformity of illumination will not be affected, although the average intensity of illumination will vary.

For any value of k there is a minimum photometric curve for uniform illumination. This curve will give at that particular spacing the highest illumination efficency consistent with uniformity of illumination. The familiar extensive, intensive and focusing reflectors are designed to approximate such curves. The values of k for the extensive. intensive and focusing curves are respectively 2, 1¼ and ¾. In other words, if it is desired to mount the light-units at k = 2 or the height one-half the distance apart, the most efficient curve giving uniform illumination is the extensive curve. As a general rule, spacing light-units closer together or higher than their correct k-value calls for, still gives uniform illumination, but decreases the illumination efficiency. Spacing light-units farther apart or lower than their k-value calls for, increases the illumination efficiency and decreases the uniformity. It is sometimes desirable to do this, sacrificing uniformity to a certain extent in favor of efficiency.

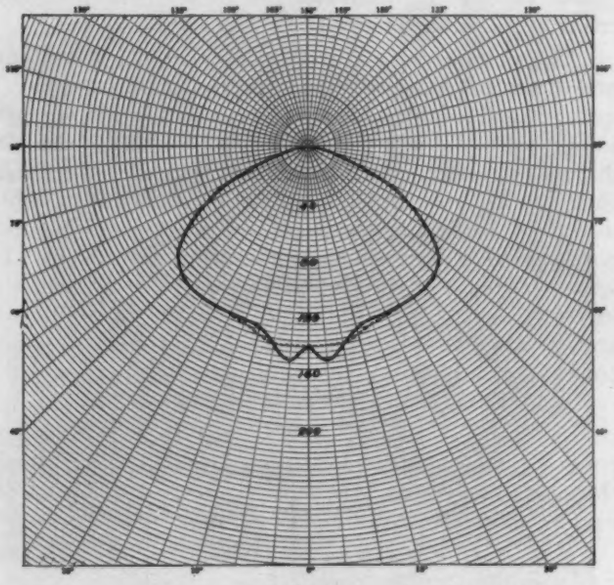


Fig. 2.

When the well-known extensive, intensive and focusing reflectors are used, it is a simple matter to

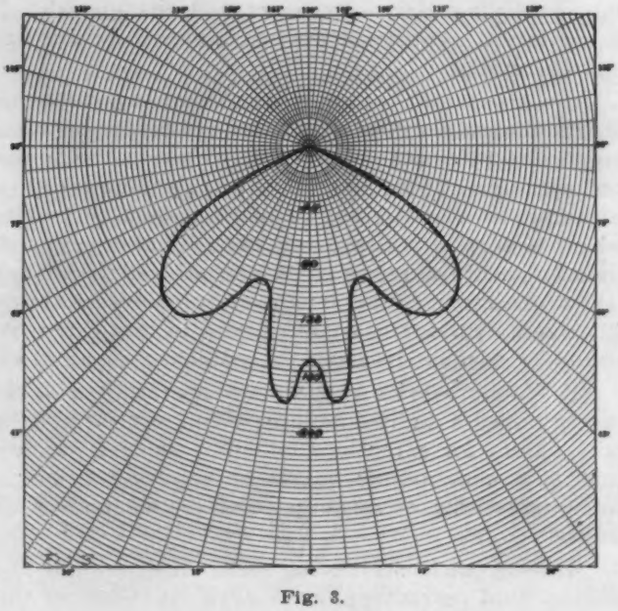


Fig. 3.

space the light-units correctly. It often happens, however, that light-units giving other curves are to be used. For nearly every light-unit there is some minimum value of k at which the best uniformity is obtained. Given the photometric curve, this value can be obtained by the method described below. It should be noted, however, that this method is applicable only

to curves having not more than one general change in curvature in the lower hemisphere, such as the curves shown in Figs. 1 and 2. What might be termed freak curves, such as shown in Fig. 3, cannot be spaced to give uniform illumination efficiently. They are undesirable for general illumination.

To determine the best k-value for curves as shown in Figs. 1 and 2, any slight irregularities should be first eliminated and the dotted line curves shown in the figures should be used. These dotted line curves are for practical purposes the same as the solid line test curves. After making this revision in the curve, it should be compared with the "critical angle curve"

Table I.

Critical Angle.	k.	Critical Angle.	k.
10°	.35	31°	1.20
11°	.39	32°	1.25
12°	.43	33°	1.30
13°	.46	34°	1.35
14°	.50	35°	1.40
15°	.54	36°	1.45
16°	.57	37°	1.51
17°	.61	38°	1.56
18°	.65	39°	1.62
19°	.69	40°	1.68
20°	.73	41°	1.74
21°	.77	42°	1.80
22°	.81	43°	1.87
23°	.85	44°	1.93
24°	.89	45°	2.00
25°	.93	46°	2.07
26°	.98	47°	2.14
27°	1.02	48°	2.22
28°	1.06	49°	2.30
29°	1.11	50°	2.38
30°	1.15		

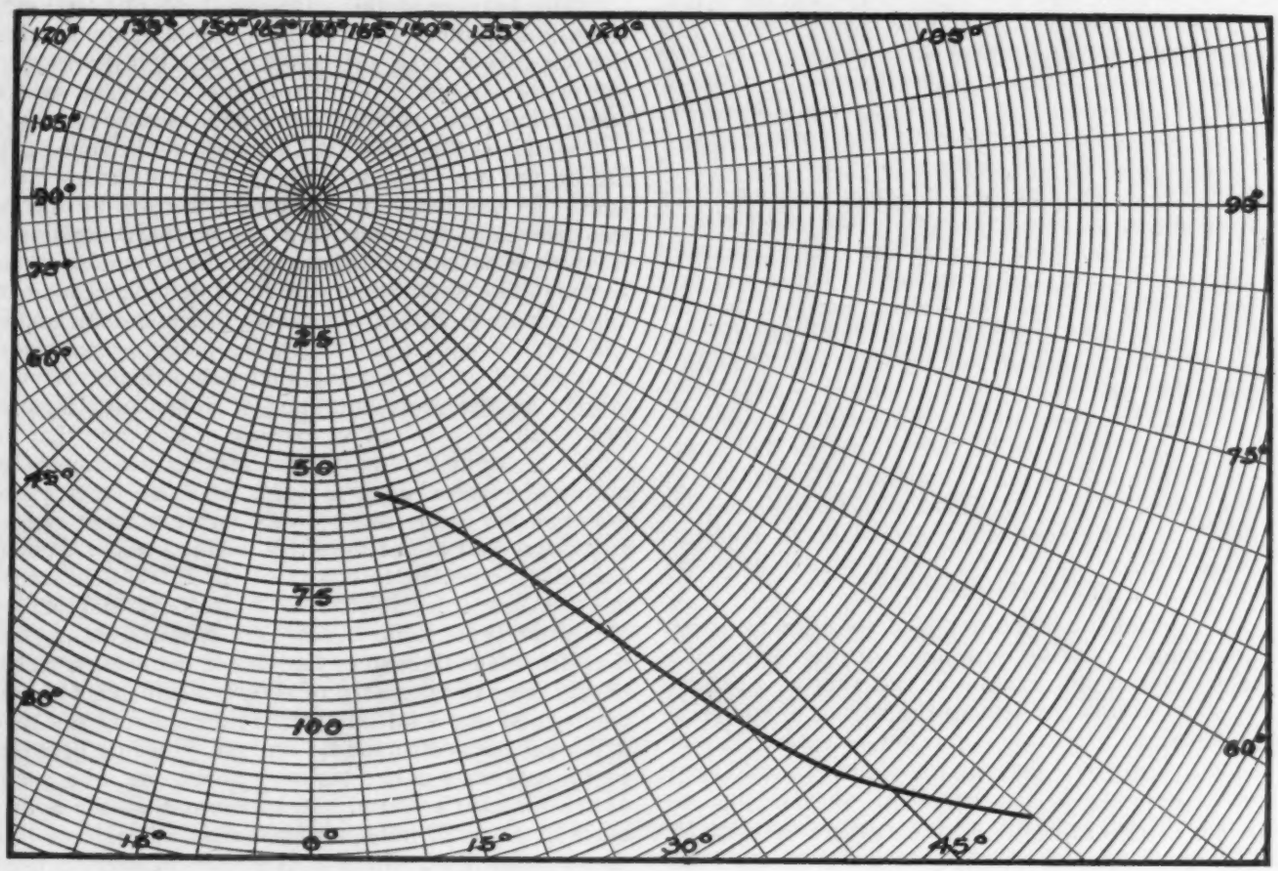


Fig. 4.

shown in Fig. 4. This curve is derived from the prototype or original extensive, intensive and focusing curves.[1] The photometric curve (dotted line) should be plotted to the scale 100 units downward; i. e., all the values should be increased or decreased in the proportion which will make the downward intensity 100. Comparing this curve with the critical angle curve the angle of intersection should be observed. Referring then to Table I the value of k can be obtained.

This method has been found to give results sufficiently accurate for all practical purposes, and with a careful observance of the limitations pointed out above it may be used with confidence by the designer of lighting systems.

[1]See "Standard Relations of Light-Distribution"; Arthur J. Sweet. Transactions Illuminating Engineering Society, November, 1909.

Uniform illumination is a result of correct design of the lighting appliance and its proper installation. In what is known as direct lighting, the area which can be uniformly illuminated with a certain lamp or quantity of light flux, is not dependent upon the height of suspension or the intensity upon mounting height, where reflectors of proper design are used. In this connection, the law of inverse squares—that light varies inversely as the square of the distance from its source—may be misleading and causes many to arrive at wrong conclusions. By use of a properly designed reflector the light flux may be so distributed that the same floor area or reference plane will always be uniformly illuminated, and with the same intensity, irrespective of the mounting height.

SERVICE CONNECTION RULING.

The following is decision No. 1164 of the Railroad Commission of the State of California in the case heard before Commissioner Max Thelen, of Edgar L. Stewart, complainant versus Great Western Power Company, a corporation, defendant:

Opinion.

This complaint was filed for the purpose of compelling the defendant to serve complainant with electric energy for lighting, heating and power purposes. The complaint alleges, in effect, that on or about July 1, 1912, the defendant agreed to supply complainant forthwith, at its own expense, with electric current for lighting, heating and power and that for that purpose it would construct, at its own expense, an electric transmission line to complainant's house, located on his ranch, about half a mile northwesterly from the village of Denverton, in Solano county, California; that the defendant has frequently represented that it would give such service to the complainant but that it has failed to do so; that the complainant, acting on the representations of the defendant to the effect that it would soon supply him with electric energy, incurred an expense of some $200 in wiring his house and preparing for the reception of electric energy; that defendant has refused to supply complainant unless complainant, at his own cost and expense, should build a transmission line to convey the electric energy from the lines of the defendant to complainant's house; and that defendant has built its lines as far as the village of Denverton and is now supplying electric energy at said place. The complainant asks this commission to make its order compelling defendant to construct a line to complainant's home and thereafter to supply complainant with electric energy.

The defendant thereafter filed its offer to satisfy the complaint, offering to reimburse the complainant all his expense, not exceeding the sum of $200, for labor and material incident to the wiring of complainant's house in preparation for the reception of electric energy, provided that the complainant would agree to repay this sum to the defendant when electric energy should be supplied to the complainant by the defendant or by any other central station company. The complainant refused to agree to this offer to satisfy his complaint.

The defendant thereafter filed its answer denying most of the material allegations of the complaint.

The answer states that defendant is willing to supply complainant if he, at his own cost and expense, will build a line to convey electric energy from Denverton to his house and will install the transformer necessary to reduce the voltage of defendant's current from 22,000 volts to 220 volts, or if complainant will secure for the defendant a right-of-way over the land intervening between complainant's house and defendant's 22,000 volt line at Denverton and will reimburse defendant for its cost and expense in furnishing and installing the necessary and proper transformer, poles, wires and other equipment in order to enable the defendant to deliver current to the plaintiff. The answer further sets forth that although the complainant's business was solicited by one of the defendant's agents on or about July 8, 1912, it thereafter became impossible for the defendant to secure the necessary right-of-way over the land contiguous to the premises of the complainant, with the result that defendant was unable to build its transmission main across complainant's premises as it had anticipated doing, but found it necessary to construct said main at a distance of about one mile from complainant's premises. The answer further alleges that it would cost defendant over $1800 to prepare itself to supply complainant with electric energy and that the average monthly revenue which it would receive from the sale of current to complainant, in accordance with his original application, would not exceed the sum of $7.50 per month, or $90 per year.

The hearing in this case was held in San Francisco on December 4, 1913. It appeared at the hearing that on July 8, 1912, the complainant signed an application for electric service from the defendant, which application was headed "Contract for electric current," but contained the clause that it should not become binding on the company until accepted by its sales manager. It was never so accepted. Certain agents of the defendant, however, held out to the complainant from time to time the hope that he would soon be served. The application was for a connected load of approximately .72 kw. for twelve 16 c.p. carbon lamps and for 7½ h.p. at 220 volts, for pumping purposes. It appeared at the hearing that complainant, relying largely on the representations of defendant's agents, had wired his house at an expense of $200 and that he would consume electricity for lighting his house, by means of some 50 electric lights, and also for a 1 h.p. motor in his dairy, and possibly for an electric range. It appears that at the time this business was solicited, defendant expected to construct its 22,000 volt transmission line from Isleton to Napa over and across the property of complainant and his neighbors, but that defendant thereafter was unable to secure a right-of-way over the property of certain neighbors of complainant on terms satisfactory to the company and that it thereafter constructed its transmission line between said points on a public highway about one mile north of complainant's house. It appeared that for a distance of some 20 miles no current is taken from this transmission line, with the exception of current used to supply certain requirements of the Solano Irrigated Farms Company in and about the community formerly known as Denverton. The necessary distributing lines to supply these needs were constructed at the expense of the Solano Irrigated Farms Company and are their property.

It appears that if defendant is to serve complainant there are two possible methods of securing this end: (1) the construction of a line from defendant's transmission main running along the county road, about one mile distant from complainant's house: (2) the construction of a transmission line to connect with the end of the line of the Solano Irrigated Farms at Denverton, a distance of 6/10 miles from the complainant's house.

For the construction of a three-phase, pole top substation and line from defendant's 22,000 volt transmission line under the first alternative, the company estimates a total cost for pole top substation and one mile of three-phase line of $1822.54. This commis-

sion's electrical rate department estimates for the same construction a cost of $1652.10. For a single-phase pole top substation and line in place of the three-phase construction, this commission's electrical rate department estimates a total cost, including overhead expenditures, of $1148.67.

To cover the construction of a single-phase power line from the end of the line of the Solano Irrigated Farms Company to complainant's house, the electrical rate department estimates a total cost of $490.

The following table shows an estimate of total annual cost to defendant if it should be compelled to construct and maintain the line one mile long from its main transmission line to complainant's house, on the theory that a single-phase line is constructed:

	Per Year
Interest on investment at 7 per cent	$ 80.50
Average depreciation (including current repairs) at 7 per cent	80.50
Total fixed charges	$161.00
Meter expense, billing and collecting	9.00
Power cost at ¾c per kw.-hr. taken from transmission line (base rate)	22.00
Total annual cost to company	$192.00

The defendant has offered that if complainant would construct this line the defendant would maintain the same and refund 20 per cent of the monthly bill. The following table shows the result of such an arrangement:

Cost to Complainant:	
Interest on investment	$ 80.50
Annual bill minus refund	57.60
Total	$138.10
Cost to Company:	
Depreciation of line and substation	80.50
Cost of power on transmission line	22.00
Maintenance, billing and collecting	9.00
Total cost	$111.50
Annual bill minus refund	57.60
Approximate annual loss to company	$ 53.90

If complainant installs the extension from the end of the line of the Solano Irrigated Farms Company, as he has been authorized to do by that company, the result will be as follows:

Interest on investment of $490 at 7 per cent	$ 34.30
Depreciation	34.30
Total interest charges	68.60
Estimated average bill	72.00
Total annual cost to complainant	$140.60

Great Western Power Company has hertofore applied to this commission for a certificate to the effect that public convenience and necessity require and will require the service by that company of electric energy to the county of Solano. In securing such certificate, the defendant necessarily held itself out as being ready and willing to serve all of Solano county on terms and conditions which are reasonable. The question in this case accordingly is not whether the defendant is under the duty to serve the complainant or any other inhabitant of this county, but rather under what terms and conditions such obligation should be performed. While it is the general rule that it is the duty of a utility holding itself out as being willing to serve a certain territory, to incur at its own expense the necessary capital expenses and thereafter to serve the applicant at the published rates, there may be cases in which the expenditure necessary to serve would be so large or in which the other conditions would be such as to make it unreasonable both from the point of view of the company and of its other subscribers, to demand that the necessary extension shall be made entirely at the cost of the utility. I am of the opinion that the present case is one falling within the exception rather than within the general rule. It appears that in order to serve complainant from the defendant's main transmission line between Isleton and Napa it will be necessary for defendant to incur an initial expenditure of at least $1148.67, with subsequent charges for operation, maintenance and depreciation, to secure a revenue which will probably not exceed the sum of $72 per year. The evidence shows that there is no reasonable possibility of any other customer being served from the line to complainant's premises. If defendant is to be compelled to serve the complainant in this way, I find that such service should be ordered only on the condition that complainant should pay to the company in addition to his monthly bill, the sum of $9.10 each month for fixed charges on the excess investment necessary to serve him in this way. If complainant is willing to give to the defendant a satisfactory bond to pay this amount for five years from the beginning of service, this commission will make its order directing the defendant to serve him by this route, but otherwise such order will not be made.

From the point of view of the complainant, it would undoubtedly be cheaper to construct a single-phase pole line from the end of the Solano Irrigated Farms Company's line, a distance of some 6/10 miles from his house, at a total cost of some $490. It would be unreasonable to ask the defendant to construct this line, for the reason that the defendant would then find itself in the position of having the lines owned by the Solano Irrigated Farms Company intervening between two portions of its plant. If the Solano Irrigated Farms Company should cease to use its line, the Great Western Power Company would find itself with a piece of its line entirely disconnected from the remaining portions of its system. The company has offered to serve electric energy through the line of the Solano Irrigated Farms Company and the extension thereof to the complainant's house, provided complainant will, at his own cost, construct such extension. If the complainant is willing to adopt this alternative and if he finds the defendant unwilling to serve him through such line, he may draw the matter to the attention of this commission, whereupon the necessary order will be made.

If complainant is not willing to adopt either of the above alternatives, the defendant should repay to him, as provided in its offer to satisfy, the sum of $200 which complainant has expended in wiring his house, provided that the complainant shall repay to the defendant said sum when electric energy shall be furnished to the complainant, either by the defendant or by any other central station company. The defendant should also reconvey to complainant the right-of-way which complainant heretofore deeded to the defendant in the expectation that he would receive service thereover from the defendant. The property was deeded without any payment on the part of the Great Western Power Company and that company certainly should not retain the property while refusing to serve complainant over this right-of-way.

It should be distinctly understood that this commission does not approve the apparently growing tendency on the part of public utilities in this state to refuse to make extensions unless the proposed customer pays for the extension. A very usual arrangement to which this commission's attention is being frequently directed, is an arrangement by which the consumer pays for the cost of the extension and is reimbursed in the amount of 20 per cent, or some similar amount, of his bill month by month. Ordinarily this commission will not approve of such an arrangement. Unless an exceptional case is presented, the commission will adhere to the general principle to the effect that it is the duty of a public utility to build at its own expense all extensions which are necessary to serve persons residing in territory which the company either by direct assertion or by necessary inference holds itself out as ready to serve.

In the present case the general rule is not applied for the reason that it seems clearly to be a case of an exception to the general rule, in which it would be unfair to the utility and to its other customers if it were compelled to incur the large expenditures hereinbefore referred to for the purpose of securing a maximum revenue of only $72 per year. In this connection attention should be drawn to the fact that the company has served no one from its high transmission line for a distance of more than 20 miles, excepting in the case of the Solano Irrigated Farms Company, who have built their own distributing lines, and that if a line is built to serve the complainant, there is no reasonable anticipation that this line may be used to serve anyone else.

In conclusion, it should be understood that each case of an asserted exception to the general rule of the duty of a utility to make extensions at its own expense must be clearly proved before this commission will authorize a deviation from the general rule.

I submit herewith the following form of order:

Order.

A public hearing having been held in the above entitled proceeding and the case having been submitted, and being now ready for decision.

It is hereby ordered as follows:

1. Defendant shall construct a pole top substation and a single-phase pole line, complete with transformer and meter, from its main transmission line between Isleton and Napa, a distance of approximately one (1) mile, to serve the complainant in this proceeding, and shall thereafter serve him with electric energy for lighting, heating and power purposes, but only on condition that complainant shall first have executed and delivered to defendant a satisfactory bond agreeing to pay to defendant each month for a period of five (5) years, whether he uses electric energy or not, the sum of nine dollars and ten cents ($9.10) in addition to his monthly bill at the established rates. If the parties cannot agree with reference to the sufficiency of the bond, the matter may be referred to this commission.

2. If complainant, at his own expense, constructs a single-phase pole line from the end of the Solano Irrigated Farms Company's line near the village of Denverton to his house, defendant shall thereafter serve him with electric energy through the line of the Solano Irrigated Farms Company, in accordance with that company's offer, and through the line so constructed by complainant, and shall charge for such service the regular rates on file with this commission.

3. If complainant does not elect to pursue either of the foregoing alternatives, he shall so notify the defendant, whereupon defendant, shall, in accordance with its offer to satisfy, on file in this proceeding. reimburse the complainant in the sum of two hundred dollars ($200), this being the amount of money expended by complainant for material and labor incident to the wiring of complainant's house in preparation for the reception of electric energy, provided that complainant shall repay said sum to the defendant if electric energy is hereafter supplied to complainant either by the defendant herein or by some other central station company.

4. Within thirty (30) days from the date of this order, complainant shall notify this commission and the defendant as to which of the foregoing alternatives, if any, he desires to pursue.

The foregoing opinion and order are hereby approved and ordered filed as the opinion and order of the Railroad Commission of the state of California.

THE TRANSISTHMIAN DUCT LINE.

The study of the engineering features covering the transisthmian duct line has now been completed, and it has been decided to lay a 4-way, vitrified clay duct line from Colon to Balboa, to contain the signal cable and the telephone-telegraph cable. One duct is available for lease or rental, and the other spare duct is left for future requirements.

The duct will follow the line of the Panama railroad. It will be laid on a base of concrete approximately five inches thick, and encased with three inches of concrete on the top and sides.

Manholes will be located according to the theoretical spacing of loading points, which places the manholes every 774 feet. They are to be of the concealed type, and each composed of only three different pieces. The pieces will all be cast at one central point and distributed along the right-of-way. The light weight of the parts and the flat shape of the individual pieces will allow a knockdown shipment to be handled easily, and with a minimum of breakage.

The signal cable will consist of approximately 215,000 ft. of 13 solid conductor and 50,000 ft. of nine solid conductor No. 12, Brown and Sharpe gage.

The telephone-telegraph cable will consist of 257,730 ft., 38 pairs of 19-gage solid conductors, quadded, and 12 pairs of 16-gage solid conductors in pairs. This will offer an increase over the present telephone trunk lines of approximately 30 circuits.

Armored cable will be installed at bridges Nos. 140 and 309, crossing the Gatun and Chagres Rivers.

Specifications and requisitions covering the 4-way multiple duct, the cables, loading coils, and other adjuncts were completed by the telephone and signal department of the Panama railroad on November 17. Work will be started as soon as the duct arrives on the Isthmus. Duct will be laid at the rate of 1500 ft. per day.

LETTER TO THE EDITOR.

Suit Against Forest Service.

To the Editor:—Under the heading, "Suit Against the Forest Service," on page 214 of your issue of September 6, is an item which makes it appear that the Forest Service objects to hydroelectric development. You state in that item that the Forest officials "are opposed to the construction of the proposed aqueduct through a section of the forest reserve."

The Forest Service does not object to the construction work which the company is doing or to the flooding of National Forest lands for reservoir purposes, provided only that the company will comply with the requirements of the law under which such use of National Forest lands may be permitted. This the company has so far declined to do, claiming that the Act of February 15, 1901, under which a permit might be secured is unconstitutional. The Forest Service therefore has not even had the opportunity to pass upon the question of the permit for the construction work which the company contemplates.

I know the fairness of the Journal of Electricity, Power and Gas in questions relating to power development upon public lands and I should be glad to help you with full information which gives at least the Forest Service point of view. It seems to me in the present instance that the information upon which your news note was based was incomplete and that a statement of the government's side of the question would have carried additional value to the reader. The essential facts with respect to this case are as follows:

The Pacific Gas & Electric Company has maintained for several years a small storage reservoir on the South Fork of the Yuba River in Nevada county, California, and within the boundaries of the Tahoe National Forest, known as Lake Spaulding. It is understood that this reservoir was built about 1892 by the South Yuba Water Company, a corporation organized in 1880 for the purpose of supplying water primarily for mining operations. On account of legislation prohibiting hydraulic mining on certain streams, the company extended its canal system to supply water for the irrigation of the foothill fruit lands in Nevada and Placer counties. Certain members of the South Yuba Water Company, on January 6, 1895, organized the Central California Electric Company for the purpose of utilizing the power drops which existed along the canals. The first power plant was begun at Newcastle in 1895, and the following year electric power was transmitted to Sacramento. This plant had a capacity of 1070 horsepower. Shortly afterward a second plant of 1340 horsepower was built at Auburn, and in December, 1901, a third plant of 4000 horsepower capacity was put into operation at Alta.

On December 4, 1901, the California Gas & Electric Corporation was incorporated and took over, among other companies, the Central California Electric Company. On October 11, 1905, the Pacific Gas & Electric Company was incorporated as a holding company to acquire the capital stock of the California Gas & Electric Corporation and the San Francisco Gas & Electric Company. Since January 1, 1906, the Pacific Gas & Electric Company has operated all the properties of the companies which were taken over by the California Gas & Electric Corporation, and at the present time owns in absolute fee all the properties which it operates. These are, substantially, the steps by which the title to Lake Spaulding passed from the South Yuba Water Company to the Pacific Gas & Electric Company.

The Lake Spaulding reservoir as originally constructed had a capacity of about 6000 acre ft. and occupied an area of about 216 acres, all of which is owned by the Pacific Gas & Electric Company. On account of the necessity of providing additional storage and of constructing a new aqueduct for the proposed Bear River development, the company made plans for the construction of a new dam across the South Yuba River a short distance below the original dam. The new dam when constructed will form a reservoir having a capacity of 92,000 acre feet and will flood about 800 acres. Of this area some 55 acres in the SW. ¼ of Sec. 10, T. 7 N., R. 12 E., M. D. B. & M., are vacant public land within the Tahoe National Forest. The line of the proposed aqueduct will cross for some 1300 ft. vacant public lands within the Tahoe National Forest in Sec. 2, T. 16 N., R. 11 E., M. D. B. & M. Also in the same section, but outside the National Forest boundary, the aqueduct will cross some 3000 ft. of land which the company claims to own but which the records of the General Land Office show to be vacant public land.

By Act of Congress approved May 14, 1896 (29 Stat., 120), the Secretary is "authorized and empowered, under general regulations to be fixed by him, to permit the use of rights of way to the extent of twenty-five feet, together with the use of necessary ground, not exceeding forty acres, upon the public lands and the forest reservations of the United States, by any citizen or association of citizens of the United States for the purposes of generating, manufacturing, or distributing electric power." The Act of February 15, 1901, (31 Stat., 790), repeats the provision of the earlier act and, in addition, gives the secretary authority to issue permits in certain National Parks in the state of California. Regulations under the earlier act were issued by the Secretary of the Interior in July, 1906, and under the later act at various times by both the Secretary of the Interior and the Secretary of Agriculture—by the latter for public lands within the National Forests, and by the former for such lands outside the National Forests.

The officials of the Pacific Gas & Electric Company claim that in so far as the regulations above mentioned require the company to secure a permit before entering upon lands of the United States, such regulations are in violation of the acts of Congress under which they are issued and of the constitution of the United States. A somewhat similar claim was advanced by the Utah Power & Light Company in a suit involving lands of the United States on the Cache National Forest in Utah. The Utah company, however, had constructed its works upon the public lands prior to their inclusion within a National Forest, and its plant was in operation at the time the suit was instituted. The company claimed that its rights had vested under the Act of July 26, 1866 (Rev. Stat. Sec. 2339) and that its tenure of the public lands was authorized and protected under the laws of the state of Utah. The case went on appeal to the United States

Circuit Court of Appeals for the Eighth District. In an opinion filed November 14, 1913, the court says:

> The proposition that absolute and perpetual rights in the public lands may be acquired for private gain by mere appropriation, without purchase or compensation, and in the exercise of a state sovereignty which transcends the constitutional power of the congress, is a somewhat startling one. * * * * * * The constitution of the United States provides that "Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or the property belonging to the United States." This is the supreme law of the land and embodies an express grant of power to the national government. It has been construed to mean that title and rights in and to the public lands are created by the acts of congress, and must be governed by their provisions whether they be hard or lenient, and that no rights whatsoever can be obtained in the lands of the United States except as congress may consent.

The opinion further holds that the Act of May 14, 1896, and the rules and regulations promulgated thereunder, by making specific and comprehensive provisions respecting a subject such as the generation and distribution of electric power, withdraw that subject from the operation of the prior Act of 1866, saying:

> The result is that whatever rights to burden the public lands may have been recognized or confirmed by Section 2339 of the Revised Statutes, those involving the generation, manufacture, and distribution of electric power have been withdrawn, modified and restricted by the subsequent act of May 14, 1896. This later legislation became effective prior to the initiation of appellee's claim. The power company has not availed itself of the provisions of this later statute; therefore, its rights, if any, are subordinate to those of the government.

On September 26, Mr. Britton, vice-president and general manager of the company, appeared before the secretary in Washington to ask for a waiver of the regulations and for permission to construct under stipulation and without formal permit, pending a legal determination of the rights of the government. He claimed that there was immediate necessity for the construction of the aqueduct and that if his request was not granted it would be impracticable to complete the aqueduct before next year. After full consideration the secretary denied the request on the grounds that it was not proper to allow the Pacific Gas & Electric Company to occupy National Forest lands on terms different from those under which such lands were occupied by other applicants; that, had it desired the company could long ago have secured permit and even now could in a short time prepare an application under the regulations of the department; and that if it declined to do so, the company and not the government must assume the responsibility for any delay in the completion of the power project.

The company has long known that it could not be allowed to occupy National Forest lands without a permit. As early as the spring of 1912 the company, through Mr. Wise, took up informally with the chief engineer of the Forest Service, then stationed at San Francisco, the matter of application for a permit to occupy the National Forest land which would be flooded in the enlargement of Lake Spaulding and which would be crossed by the proposed Drum Aqueduct. The company was also formally notified in August, 1912, by the Forest Supervisor that its proposed occupancy of National Forest land would necessitate the securing of a permit. Although the necessary application might have been prepared in a month's time the company preferred not to do so, but instead, somewhat over one year later, namely, on August 26, 1913, filed a suit in equity in the district court for the northern district of California asking that the court restrain the Secretary of Agriculture and the officials of the Forest Service from preventing the company from occupying and using the lands of the United States without permit.

Under the provisions of existing law as interpreted by the highest court that has yet passed upon it, neither the officials of the Forest Service nor the Secretary of Agriculture have authority to allow the Pacific Gas & Electric Company to flood the lands of the United States in section 10 or to cross those in section 2 until it has secured a permit in conformity with the general regulations of the department.

F. S. GRAVES, Forester.

[Aside from a few errors as to early historical data Forester Graves makes a complete statement as to the Government's side of the question. From the company's side it is only fair to add that their main reason for not securing a permit is their thought that such action might give a perpetual option for governmental purchase of their entire system. This communication has been published because of our invariable practice of trying to present both sides of a disputed point. Further comment from our readers will be welcome.—The Editors.]

The record of Panama Canal work from American occupation until Dec. 1, 1913, shows a total excavation of 213,904,031 cu. yds. and a total amount of concrete in locks and dams of 2,890,012 cu. yds. in addition to 25,950,894 cu. yds. of fill in the dams. This has been done at a total cost of $307,385,800.

CENSUS FIGURES ON ELECTRIC LIGHT AND POWER.

Preliminary figures of the forthcoming quinquennial report on the central electric light and power stations of several states have been given out by Director W. J. Harris of the Bureau of the Census, Department of Commerce. The statistics relate to the years ending December 31, for 1912 and 1907, and June 30 for 1902, and cover both commercial and municipal electric plants. They do not include electric plants operated by mining companies, factories, hotels, etc., which consume the current generated, those operated by the Federal government and state institutions, or plants that were idle or in course of construction.

The figures as presented for Arizona show that during the decade 1902-1912 there were substantial gains in the industry. In the case of the aggregate income of the 16 establishments reported in 1912 there was a gain of $879,166 over 1902, or 300 per cent. There were also large gains in total horsepower reported, the kilowatt capacity of dynamos, and the output of stations in kilowatt hours.

Arizona.

The figures in detail are shown in the accompanying table:

	1912.	1907.	1902.	Per cent of increase 1902-1912.
Number of establishments	16	15	13	23.1
Commercial	16	15	13	23.1
Municipal	.....	.....	.....	....
Income	$1,172,232	$569,850	$293,066	300.0
Light, heat and power	$1,127,908	$544,192	$288,019	291.6
All other sources	$44,324	$25,658	$5,047	778.2
Total expenses, including salaries and wages	$923,258	$464,350	$240,953	283.2
Total number of persons employed	217	148	86	152.3
Total horsepower	22,075	7,746	2,540	769.1
Steam and gas engines (including turbines):				
Number	33	33	27	22.2
Horsepower	12,775	6,906	2,540	403.0
Water wheels:				
Number	4	4	.....	....
Horsepower	9,300	750	.....	....
Auxiliary engines:				
Number	(1)	2	.....	....
Horsepower	(1)	90	.....	....
Kw. capacity of dynamos	14,756	4,939	1,811	714.8
Output of stations, kw.-hr.	32,960,084	9,392,302	3,662,045	800.0
Estimated number of lamps wired for service:				
Arc	686	[2] 754	295	132.5
All other varieties	136,400	[2] 72,028	36,556	273.1
Stationary motors served:				
Number	741	339	432	71.5
Horsepower capacity	12,547	2,220	714	....

[1] Not reported separately.

[2] Exclusive of 17 arc and 857 lamps of other varieties reported by the electric companies as used to light their own properties. Lamps used for such service were included in the number reported for 1912.

New Mexico.

The figures as presented for New Mexico show that during the decade 1902-1912 there were substantial gains in the industry. In the case of the aggregate income of the 21 establishments reported in 1912 there was a gain of $360,351 over 1902, or 266 per cent. There were also large gains in total horsepower reported, the kilowatt capacity of dynamos, the output of stations in kilowatt hours, and in the number of stationary motors served.

The figures in detail are shown in the accompanying table:

	1912.	1907.	1902.	Per cent of increase 1902-1912.
Number of establishments	21	15	11	90.9
Commercial	18	15	11	63.6
Municipal	3	.....	.....	....
Income	$495,658	$292,682	$135,307	266.3
Light, heat and power	$486,185	$289,962	$133,747	263.5
All other sources	$9,473	$2,720	$1,560	507.2
Total expenses, including salaries and wages	$449,516	$226,937	$102,201	339.8
Total number of persons employed	158	83	45	251.1
Total horsepower	11,015	4,548	1,780	518.8
Steam and gas engines (including turbines):				
Number	41	26	21	95.2
Horsepower	10,198	4,035	1,730	489.5
Water wheels:				
Number	9	6	1	800.0
Horsepower	817	513	50	....
Kw. capacity of dynamos	7,981	3,789	986	709.4
Output of stations, kw.-hr.	9,027,824	4,614,349	2,637,810	242.2
Estimated number of lamps wired for service:				
Arc	377	[1] 332	272	38.6
All other varieties	112,207	[1] 55,379	22,507	398.5
Stationary motors served:				
Number	639	195	75	752.0
Horsepower capacity	4,084	1,231	100	....

[1] Exclusive of 2 arc and 506 other varieties of lamps reported by the electric companies as used to light their own properties. Lamps used for such service were included in the number reported for 1912.

VALUATION OF WATER POWER SITES.

BY RUSSELL L. DUNN.

(The author compares a Supreme Court rule for evaluating railroad sites with the Interior and Agriculture departments method of valuating water power sites and draws some interesting conclusions. The article is abstracted from a pamphlet entitled "A Dissertation on Mining Law.")

A water power site comprises the land on which are erected the water power works, dams, reservoirs, canals, pipe lines, power houses, etc., of an actual water power development. This land when the water power development is made has precisely the same relation to the water power business that the land on which the rails of a railroad are laid, and on which its depot and other structures are built, has to the railroad business. There is absolutely no difference in the relation.

In the case of the railroad, the land on which the rails are laid and the buildings erected—the railroad site—is worth just its present value as land—worth what a similar tract of land alongside of it is worth. The United States Supreme Court said this was the rule of worth or value for the railroad site land in the Minnesota rate case. The department of commerce is bound by this rule and will employ it in valuing the physical property of the railroads of the United States. But in the case of the so-called water power sites the interior and agricultural departments do not value them at present worth as land, but value the land by the earning power of the developed water power, which is the same as if the railroad site land were valued by the earning power of all the traffic over the railroad.

If water power site lands in the unsettled mountain territories of the western states be valued by the rule of present value, the same as are railroad site lands, they are worth no more than their price to settlers on them, whether the settlers be miners, farmers or stockmen—from $5 an acre down to $1.25 where it is the public land. That, however, is for the actual water power site land—the comparatively small areas which bear existing structures of water power works. It is not the value for the public lands which have been classified as water power site land and so reserved. These lands, classified as water power sites, are not really water power site lands at all, for there can be no water power site land without an actual water power works on it. Dream water power works are built on dream land sites, not on real land sites.

The classified public lands reserved as water power sites are almost wholly subdivisions which include water courses—creeks, river and lakes. Their reservation blocks the diversion of the water for water power or any other use. That, indeed, is the real purpose of the reservation—the blocking of private enterprise in water power development. Federal officials could not hold up water power development directly for want even of color of authority of law, so they do it indirectly by reserving the land which included the water on pretense that it is water power site land—incidentally excluding mining occupancies and purchases on the pretense of the greater value of the land for water power site purposes.

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The Corporation with a Soul

The "soulless corporation" is soon to be a thing of the past. so far as the public service corporation is concerned. No matter what the impelling motive that may bring about this change, whether it be due to public policy or private profit, the public service corporation must now realize that a soul is an essential part of its corporate life in serving the public. People know that every corporation has a head, but they usually see only its stomach. When they believe that it has a soul they will give it their confidence.

Consequently every official and employe of a public service corporation should learn what the soul is. Today it is not the hazy thing it used to be. While its exact nature may not be known, yet, like electricity, a satisfactory practical meaning can be learned from its effects.

The dictionary defines soul as a "spirit connected with a body or material organization." So a corporate body, such as a corporation, with the proper spirit has a soul. A more precise definition is given by Gerald Stanley Lee in his new book on "Crowds," "a man's soul is the faculty in him for seeing the whole in relation to the part—his vision for others in relation to his vision for himself." But is not this the very object of true public service and should not this spirit, or this faculty, be the actuating impulse in every public service corporation?

Regard the corporation soul as the sense of proportion concerning the rights of others, let it combine the ideal of the service of all men by all other men with the conception of the value of the individual; express this spirit as an active working principle in all business dealings, and the corporation will attain the highest pinnacle of success, "the science of being believed in."

Procrastination or Education

Though somewhat tardily, the central station industry has been awakening during the past few years to the necessity for educating its employes. Two years ago at the Seattle Convention of the National Electric Light Association, and the idea was by no means new then, a paper was presented on this subject and a recommendation made to the executive committee that a committee on education and instruction of employes be appointed. Such a committee—naturally with the implied work it might accomplish—was considered an urgent need.

Not alone is the central station interested in the success of its employes, though it makes for improved service with the consequent satisfaction to consumers. The whole electrical industry now realizes that the success of the central station employe and especially that of the central station salesman, is of economic importance to all. Their effort in selling electric service creates prospective customers for other commodities.

A committee on Education of Salesmen has been appointed by the N. E. L. A., and if the report of their meeting in the December issue of the Bulletin is correct, it would appear that they have a poor opinion of their own importance. Although in the

second year of its activities, this committee has decided to question the wisdom of their appointment by asking in effect the question, "Are we necessary to you?"

It has decided to confine its efforts, as the year's work, "to ascertain, through a circular letter to all Class A members of the Association whether or not they desire to institute educational work on behalf of their employes."

Their action, in view of the known facts, savors of procrastination and will generally prove disappointing to the employes. Further discussion is a poor substitute to offer for that which for years past has been admittedly desirable.

The committee further states that it wishes to know how best it can serve its Class A members, that it may proceed along the lines which would then seem best.

Central station employes, especially the growing number of those untrained, wish to know the substance of that education which will contribute most to their advancement and the manner in which it may most readily be acquired. They tire of hearing it said that, "We must do something," and suggest instead, on the assumption that half a loaf is better than no bread, that something be tried out.

Why not call a halt to both question and theory and get action, that whatever doubts exist may thus be rapidly removed.

Noteworty Service Connection Decision

An interesting decision on connections for electric service of vital importance to central stations has recently been rendered by the California Railroad Commission. Through the commission pressure was brought to compel a central station to connect to its system the premises of a prospective consumer situated about one-half mile from high tension lines operated by the company.

Because the high tension right of way was expected to cross this prospect's property close to his buildings an application for service connection was taken by one of the company's salesmen.

This signing of an application was not considered by the commission as a binding contract as it was specifically worded that it must first be accepted by the manager of the company. This had not been done.

Later the proposed right of way could not be secured and one much farther away was followed.

The commission held that it would be unreasonable to expect the company to build a line across the prospective consumer's property to the nearest point at which energy was available. This attitude was adopted in view of the fact that this nearest point was a privately owned transmission line operated by the company. Should the owners dismantle or disconnect their system the company would then be in the untenable position of having two parts of its distribution system isolated.

Fundamentally the consumer should be required to bring out his service for connection at that point on his property nearest the supply company's lines—actual or located. This would dispose of similar questions not only automatically but equitably.

Some rate-making bodies have ruled that all service connections must be made by the central station, when the point to which service is to be connected is within a certain distance from its primary lines. But on account of the rapid development of some sections and impossibility of securing business in others, such hard and fast rules may work a hardship in both directions.

In acquiring a certificate of public convenience and necessity the central station either specifically or impliedly expresses its readiness and willingness to serve the whole territory designated. In view of this, the commission requires, as a general rule, that central stations shall make all extensions necessary to supply the people in their territory. But the commission has established the principle that no customer be served at a loss to the company as such losses have to be borne by other consumers, and it therefore follows that there must be exceptions to the general service connection rule.

The commission goes on record as being opposed to the growing practice of charging for extensions even where the charge is rebated to the consumer as a special discount from the regular bills.

On account of the anticipated service the prospective consumer had wired his premises for lights, and for electric cooking and power, at a cost of $200.

In the event af failure to connect its service the commission therefore ordered that the company refund the $200, until such time as the consumer should be served electrically, either by the company or some other central station. Just what would happen if the consumer installed a small private plant is not stated, but from the wording of the order it appears certain that the company would unfortunately forfeit its refund. This error of omission appears to constitute the only unfair possibility of this finding and probably arises out of the wording of the company's offer of settlement.

The commission pertinently points out that the central station company's annual cost to serve this consumer would be approximately $192 in return for which a revenue of $72 might be expected, leaving an annual loss of $120. On this basis, in the event of the company extending its service, the commission ordered that the consumer then give a sufficient surety to guarantee to the company a revenue of $9.10 per month for a period of five years, as a readiness to serve charge to be added to the regular schedule of rates to be paid for all energy consumed.

The complete finding is a further indication that such matters entrusted to public service commissions receive proper consideration; that they are settled more equitably than if handled solely by the interested parties—always of course with the proviso that the commission be appointed for that purpose and with proper reference to the ability of its members and that it is not "political" in the sense that its existence depends upon pandering to the public.

In this case the central station was accorded more just treatment than it had actually sought. A possible loss was averted. This, together with other facts as stated, is additional proof that the work of public service commissions serves to stabilize public utilities.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

L. P. Judd, manufacturer of the Judd Washing Machine, was in Salt Lake City last week.

W. S. Gilman Jr. has resigned from his position with the Southern California Edison Company.

Frank Somers, electrical contractor of San Jose, was at San Francisco during the past week.

W. F. Neiman, sales manager, Great Western Power Company, is on a business visit to Oregon.

G. L. Drennan has been appointed local manager Pacific Power & Light Company, Toppenish, Wash.

H. E. Sanderson, Pacific Coast manager Bryant Electric Company, is making a business trip to Seattle.

J. A. Greer, Railroad & Railway Supply Company, New York City, spent the past two weeks at San Francisco.

A. J. Dahleen, salesman Electric Appliance Company, has resigned and will engage in the insurance business at San Francisco.

Harry J. Pieper, Los Angeles, has been appointed on the membership committee of the Electric Vehicle Association of America.

A. J. Cheney will shortly join the electrical department staff, H. W. Johns-Manville Company, San Francisco, as salesman.

G. A. Wooley, manager detail and supply department, General Electric Company, Denver, was at Salt Lake City last week.

F. N. Cooley, Western Electric Company, San Francisco, has been transferred to a new position at the Seattle office of the company.

C. I. Kephart, commercial engineer, San Francisco & Sierra Power Company, has returned to San Francisco from Southern California.

F. H. Welling, Pacific Coast manager Federal Sign System, left this week for a two weeks' business trip through the Pacific Northwest.

Robert E. Wirsching, recently appointed to fill the unexpired term of **O. O. McReynolds** on the board of public utilities, has been reappointed.

J. O. Presby, salesman Holophane Works of General Electric Company, was at San Francisco over the holidays and has now left for a trip throughout Southern California.

G. I. Kinney, Pacific Coast manager for the Fort Wayne Electric Works and Sprague Electric Works of the General Electric Company, spent the past week at Los Angeles.

Sherman M. McFedries, manager controller sales, The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., is at San Francisco and will leave shortly for Los Angeles.

Frank McNabb has succeeded **J. E. Baxter**, and **C. G. Wallney** and **F. C. McLaughlin** have joined the staff in the auditor's department, Southern California Edison Company.

Melcher Eckstromer, electric vehicle engineer of Denver, Colorado, is at Salt Lake City in connection with the establishment of an agency with the Capital Electric Company for the General Motors Company's line of trucks.

Wilbur B. Foshay has severed his connection with the Northwestern Electric Company of Portland, Oregon, and is now connected with the Washington Public Service Company with offices at 1015 Wilcox building, Portland, Oregon.

W. Brewster Hall, western representative, Pass & Seymour, left San Francisco last Monday for an extended trip East by way of Los Angeles, Salt Lake City to Chicago, and will return via Spokane and Seattle; while away he will also visit the company's factory.

Glenn B. Walker, commercial engineer of the Utah Light & Railway Company, is spending the holidays at his home at Benton Harbor, Michigan. While away, he will visit friends at Pittsburg, where he spent two years in the apprenticeship of the Westinghouse Electric & Manufacturing Company.

Henry O. Lea, consulting gas engineer, Chicago, is representing Henry L. Doherty & Company, owners of the gas plant at Lincoln, Nebraska, in the gas rate hearing case to be resumed this month and is also representing the United Gas Improvement Company, in the Omaha (Neb.) gas rate hearing case.

E. J. Pietzcker, formerly southwestern sales manager, has been made western and southwestern sales manager in charge of the Chicago and St. Louis offices of the Standard Underground Cable Company, the combined territory of which, broadly speaking, embraces the Mississippi River Basin. He will divide his time between these two offices. **W. M. Rogers**, formerly chief clerk and assistant to Mr. Wiley, is appointed assistant western sales manager with headquarters at Chicago. **R. C. Houck** has been appointed assistant southwestern sales manager with headquarters at St. Louis. **E. E. Woodbury** is added to the selling force of the St. Louis office and is transferred for that purpose from the general sales department of the company at Pittsburgh.

Chas. F. Reuter has been appointed manager of the Pacific Coast district with the Ideal Electric & Manufacturing Company of Mansfield, Ohio, succeeding **R. B. Elder**, who has resigned this position to be active with his mining interests on the Mother Lode. Mr. Reuter is one of the pioneers in the engineering, machinery sales and electrical trade on the Pacific Coast, and many important enterprises are monuments to his achievements. He has made many friends among the engineering and machinery trade. His competency, close attention to his business and congeniality have made him successful and popular with the trade. Both the Ideal Electric & Manufacturing Company and Mr. Reuter should be congratulated on forming such a splendid combination.

OBITUARY.

Warner Van Norden, a retired banker of New York City, died at his home in that city on January 2d, at the age of 72 years. Mr. Van Norden at one time had large mining and water interests in California. In 1872 he became interested with the late Mr. Alvinza Hayward in the Plymouth Consolidated mine in Amador county. Through the same connections Mr. Van Norden and some of his New York associates became interested in the South Yuba Water & Mining Company in Nevada county and eventually bought the control of that company. As principal stockholder he allowed this property to develop gradually, adding thereto the property of the Bear River and Auburn Mining & Water Company which supplied water in Placer county. With this combination was formed the South Yuba Water Company. In 1895 a subsidiary company was formed known as the Central California Electric Company to develop hydroelectric power on the canals of the parent company. This power was transmitted throughout Placer county and into Nevada and Sacramento counties. This entire property was acquired by the Pacific Gas & Electric Company in 1905 and now forms the basis of the new Lake Spaulding power development now partially completed and from which it is proposed to generate 165,000 horsepower and eventually irrigate 100,000 acres of land.

Mr. Van Norden was of Dutch and Huegenot descent

and was a past president of the Holland society in New York. He was at one time president of the National Bank of North America and later organized the Van Norden Trust Company. In secular matters he was a devoted Presbyterian and one of the foremost advocates of the American Foreign Missionary movement.

He was a brother of the late Charles Van Norden, who was resident director of the South Yuba Water Company, and General Manager of the Central California Electric Company, until his retirement from active business duties in 1905, and who died at his home in Auburn, California, in May of last year. He is survived by two sons and one daughter. Rudolph W. Van Norden, consulting engineer of San Francisco, is a nephew and namesake.

MEETING NOTICES.

Inspection of Diesel Motor Ship "Siam."

Those engineers who desire to inspect the Diesel motor ship "Siam," now in San Francisco harbor, can make arrangements to do so by telephoning to this journal at Kearny 918, San Francisco. Parties will be welcomed on January 10th and 11th.

California State Association Electrical Contractors.

At the annual meeting of the California State Association Electrical Contractors held recently at San Francisco, C. F. Butte was re-elected president; Nelson Hope, vice-president; Geo. Smith, sergeant-at-arms; W. S. Hanbridge was re-elected secretary-treasurer.

San Francisco Electrical Development and Jovian League.

The Jovian Order was in charge of the regular meeting held at Tait's Cafe last week when F. H. Poss acted as chairman. Routine business was conducted and reports of committees read. P. B. Hyde, chairman membership committee reported that 25 applications had been received for the Rejuvenation to be held at Elks Hall on Saturday evening, January 10th. There are 75 more expected to be received before that time. Details were given of the entertainment to be given and all arrangements pointing to a successful Rejuvenation were completed.

Capital Electric Company Convention.

The Capital Electric Company held its semi-annual convention at Salt Lake City during the last week in December. Approximately 150 men from the three states of Utah, Idaho and Montana, representing thirteen branch houses, took part in the discussions. The convention ended with a banquet at the Hotel Utah on the evening of December 30th. R. W. Nicol, president and general manager of the Capital Electric Company, officiated as toastmaster. The managers of the various branch houses in attendance at the banquet were: L. H. Allen and R. E. Allen of Helena; C. H. Pitts, Billings; L. N. Baker, Missoula; H. A. Murphy, Butte; A. C. Probst, Great Falls; I. L. Buse, Boise; A. W. Hill, Twin Falls; H. Schafer, Pocatello; W. J. Bauchman, Idaho Falls; L. I. Hurdy, Ogden; Roy Borne, Provo; Harry Clyse, Price; Robert Folland and Claude Kugler, Salt Lake City.

TRADE NOTES.

The Decker Electric Company has been awarded the wiring contract for the Marshall School, San Francisco.

The Warman Steel Casting Company, Los Angeles, expect to immediately install an additional electric furnace.

Hobart Building plans are out for wiring estimates; Willis Polk, architects, San Francisco. Tenders are also asked for the installation of an isolated plant for this building.

The Washington Public Service Company is installing an electric and steam heating system at Olympia, Washington. The company owns the Olympia Water Works and also has railroad franchises in Olympia and from there to Tennio, Centralia, Chehalis and Gate, Washington.

Bids for the ornamental street lighting installation on Fifth street at Seattle, Wash., were as follows: Meacham & Babcock, $17,360.02; T. Ryan, $14,117.40; R. E. Downey, $14,105.86; Ne Page, McKenny Company, $14,102.35; Dicken & Rightmire, $12,278.70; Olympia Foundry Company (poles only), $1894.

A motograph electric sign, the first of this kind west of Chicago, is to be erected by the Federal Sign System for the United Advertising Sign & Novelty Company at Seattle, Wash. It will be 30 ft. by 60 ft. and contain 3000 ten-watt sign lamps. The motion mechanism is in the form of a perforated roll similar to that used in player pianos. It will be operated on direct current.

Bids for electrical work on the Horticulture, Education, Machinery Hall, Pure Foods and Manufacturers' Buildings of the Panama-Pacific International Exposition, have been opened and are as follows: Turner Electric Company, $20,600; Rex Electric Company, $18,957; Globe Electrical Works, $18,950; Butte Engineering & Equipment Company, $18,975; Newberry, Bendheim Company, $18,500; Central Electric Company, $17,850; National Electric Company, $17,800; Standard Electric Company, $16,500; H. S. Tittle, $14,104; McFeil Electric Company, $13,080.

A new corporation has been formed and is taking over the plants and business of Milliken Bros., Incorporated. The operating management, which has been responsible for maintaining the company's reputation for character of work and service has been retained, which insures continuance of the quality of the company's work, the prompt service and courteous treatment of its customers. The new company will have one million dollars of quick assets in addition to its real estate, buildings and fixtures. The company's property is free of mortgage lien. Provision has been made for such changes and equipment as will greatly increase the capacity of the fabricating plant. The company is developing both its domestic and export business, and solicits invitations to bid for all kinds of structural steel work.

BOOK REVIEW.

American Electricians' Handbook. By Terrell Croft, 711 pp.; 4x6¾; leather-bound. Published by McGraw-Hill Book Company, New York, and for sale by Technical Book Shop, San Francisco. Price $3.00.

In his preface the compiler states "This is a practical man's book." As a reference book for practical workers it is at once comprehensive and thorough. The text is divided into six sections, treating respectively of fundamentals, generators and motors, outside distribution, interior wiring, transformers and illumination. Little information that any constructing or operating man may be called upon to apply to his work is omitted. The wireman, the contractor, lineman, operator and construction man will find this a veritable encyclopedia. While it makes no claim to the interest of the designer or theoretical man, knowledge of its many points would also be valuable to them.

The Eletcrical Blue Book, 1913-14; 227 pp.; 9x12 in.; cloth bound; profusely illustrated. Published by Electrical Review Publishing Company and for sale by Technical Book Shop, Rialto Bldg., San Francisco. Price $2.

This is the sixth edition of this buyers' guide of electrical material, and many important features have been added which further increases its value. The aim of the publisher is to provide in the most compact form possible complete information respecting the rules of the National Electrical Code, the list of Approved Fittings as published by the Board of Fire Underwriters, and a visualization of the products of manufacturers which have passed tests recommended by the National Fire Protection Association as conducted by the Underwriters' Laboratories. Among the new features are also chapters on Wiring Calculations, Treatment for Electric Shock, Illumination, A. I. E. E. Code of Ethics, Motor Applications, Rate Analysis, and a Street Lighting Schedule.

NEWS OF THE CALIFORNIA RAILROAD COMMISSION.

The railroad commission rendered a decision denying the application of the Coast Counties Gas & Electric Company for authority to issue 2000 shares of its 6 per cent preferred stock.

A decision was rendered granting authority to the San Dimas Water Company to issue $15,000 of bonds for the purpose of developing additional water supply.

A decision was rendered denying the application of the Tonopah & Tidewater Railroad Company to issue $364,000 of bonds.

The commission rendered a decision reducing the schedule of rates and also wholly revising the schedule of rates of the Sierra Railway Company.

The Southern Counties Gas Company was granted authority to issue $9000 in bonds under a previous authorization.

A decision was rendered reducing the wholesale rate on natural gas piped from the Kern county fields into Los Angeles County from 18 cents per thousand feet to 14 cents per thousand.

The Midland Counties Public Service Corporation was granted authority to issue $79,000 of bonds for the purpose of paying off indebtedness incurred in construction of new lines.

Authority was granted to the Tulare County Power Company to issue $80,000 in stock for enlargements to its steam plant and for the construction of new lines and distribution systems.

A decision was rendered granting authority to the Angel's Flight Railway Company to issue $25,000 of stock.

A decision was rendered granting authority to the Northern California Power Company Consolidated to issue $12,000 of promissory notes.

NEWS OF THE OREGON RAILROAD COMMISSION.

In the matter of prescribing adequate and serviceable standards for the measurement of quality, pressure, initial voltage and other conditions pertaining to the supplying of product and service by public utilities a further hearing will be held before the commission at Room 252, Court House, Portland, Oregon, at 10:15 a. m., the 16th of January, 1914.

MONTANA PUBLIC SERVICE COMMISSION.

Commissioners: D. Boyle, chairman; J. H. Hall; E. A. Morley; R. F. McLaren, Sec.; Oscar Reynolds, chief engineer.

Report and order of the Commission No. 77 regarding alleged excessive rates charged by the Montana Power Company, makes certain adjustments and reductions in certain of the schedules of the Montana Power Company and subsidiaries. "The economies effected by the Montana Power Company by its consolidated management and other factors, probably places that company in a different situation than is presented by some of the cities or towns which are served by independent or separate plants, and therefore this decision is not intended to serve as a controlling precedent in any hearings that may be had affecting such other towns."

For Billings, Bozeman, Butte, Great Falls, Lewiston and Livingston seven schedules are provided. The general rate is based upon 10c per kw.-hr. for 100 kw. or less. An optional "readiness to serve rate" provides $3 fixed charge per year per 60 watts installed plus 5c per kw.-hr. for all current used. Both these schedules provide for free renewals of carbon lamps. Flat rate lighting is provided for on the basis of 1½c per watt per month for all-night service. A discount of 10 per cent for payment within five days is provided for all incandescent lighting bills. A 3c heating and cooking rate is provided with a dollar minimum. An industrial power flat rate of $50 per horsepower year or a sliding scale rate is available.

For 28 smaller towns the general lighting rate is based upon 12c. Other rates are about the same as for the larger towns.

The company will not extend its secondary lines more than 300 ft. from one electric light consumer. Power extensions will be made on the basis of 100 ft. for each horsepower connected.

ORDINANCE REGULATING ELECTRICAL CONSTRUCTION.

With the approval of the superintendent of the Department of Electricity, San Francisco, the building committee of the supervisors recommended for passage a new ordinance governing the sale of electrical fixtures and prescribing the manner in which installations must be made to safeguard against fire and possible loss of life.

One of the most important provisions of the new measure is that dealers in electrical supplies shall keep a record of all sales and require of persons purchasing from them notification when the fixtures or supplies so purchased are installed. This being done, the department of electricity will make an inspection of the work and determine if it has been done in the manner required by the regulations of the department.

The ordinance also provides that instead of a bond being required of contractors engaged in electrical work they shall pay an annual license fee to the city which will pay for inspection. The inspection will be a guarantee that the work has been properly performed and according to the standard required by the rules and regulations of the department of electricity. The measure also provides that instead of specifying any one standard that the best ones shall be recognized by the department in passing upon the character of the work performed. All dealers and contractors in electrical work or supplies must also register their names and places of business with the department of electricity.

NEW CATALOGUES.

(Under this heading attention is directed to catalogues and bulletins representing the latest information upon the subjects treated. The latest developments are always in advance of the most up-to-date text books. Readers are urged to write direct to the publishers for these catalogues and bulletins, which, unless otherwise stated, are available for free distribution.)

The General Electric Company's Bulletin A4171 is devoted to Ventilated Railway Motors and supersedes the company's previous bulletin on that subject.

Bulletin A4173, issued by the General Electric Company, describes the GE-201 Ventilated Commutating Pole Railway Motor, and supersedes the company's previous bulletin on this subject.

The Simplex Electric Heating Company is distributing a leaflet illustrating and describing the Simplex foot warmer rug, an "insurance against cold feet" in the home, office, on board ship, in an electric automobile or wherever electric current is available.

Lead Battery Developments During 1913 for Electric Vehicles are covered in Bulletin No. 142, issued by The Electric Storage Battery Company, Philadelphia, Pa. It is a reprint of a paper presented before the recent convention of the Electric Vehicle Association of America.

The Bryant Electric Company are distributing to the trade an ingenious device, which conveniently shows the adaptability and interchangeability of their various styles of "New Wrinkle" sockets and bases, together with the list price schedule and standard package. This is accomplished by means of a revolving circle, on whose circumference are pictures of various sockets, rosettes and switches, which can be fitted to various caps and bases illustrated on an outer stationary circle. On the reverse side are also shown interchangeable porcelain sockets and "Wrinklet" fixture sockets.

INDUSTRIAL

A NEW ELECTRIC WATER HEATER.

A 660-watt electric water heater of entirely new design has been added to the line of water heaters made by the Cutler-Hammer Manufacturing Company of Milwaukee. This new heater illustrated below has a water capacity of three quarts and because of its low consumption of current can be attached to any lighting circuit.

For the purpose of guarding against waste of current a small pilot lamp is mounted in the base of the heater, under a ruby glass lens, this serving as a signal light to show when the current is on, and as a reminder to switch it off when the heater is no longer required. A flush switch is mounted in the base, the two buttons of which facilitate the operation of switching on and off the current.

New 660 Volt Electric Water Heater.

These heaters are of particular use in the cooler months in buffets, restaurants and drug stores where used in dispensing hot drinks at the bar or soda counter or for furnishing hot water for any purpose. In the home they are suitable for furnishing hot water instantly for tea, coffee, cocoa, hot drinks, soups, broths, for the shaving mug or any other purpose for which hot water in small quantities is wanted quickly.

The frosted glass globe is decorated with cut glass stars and the base is heavily nickel plated. The heating unit is a new type and can be readily renewed.

TRAIN LIGHTING SYSTEM.

The Electric Storage Battery Company has recently put on the market an axle lighting system for the electric lighting of railway trains, which, in many respects, is a radical departure from previous practice, and involves many novel features. The dynamo, which as usual is mounted on one of the trucks and is belted to a pulley on the axle, is of the Rosenberg type which has been extensively used for axle lighting abroad as a constant current machine. This has been re-designed to give constant voltage (instead of constant current) at all speeds above that corresponding to a train speed of 15 to 20 miles per hour.

In the Rosenberg machine the main field excitation is produced by armature reaction due to current flowing between a pair of short-circuited brushes. This flow of current is produced by a small primary field excitation at right angles to the main field excitation.

The constant voltage characteristic of the machine is obtained by connecting the primary field winding across opposite corners of a Wheatstone bridge; the other two junction points of the bridge being connected across the main terminals of the machine. The bridge is composed of fixed resistances in two diagonally opposite branches and in the other two branches resistances of high temperature coefficient, such as the so-called iron wire "ballasts."

This system eliminates practically all of the automatic apparatus found in other axle lighting systems. The dynamo develops the same polarity with either direction of rotation, and therefore, requires no pole changing device. The Wheatstone bridge field control involves no moving parts or contacts and thus eliminates all of the levers, pivots, dash pots, carbon pile resistances, solenoids and similar apparatus found in other systems. The constant voltage control whereby the voltage of the dynamo is maintained but slightly above the floating voltage of the battery involves so small a range of voltage between battery charge and discharge that no lamp regulator is required, thus eliminating another series of moving parts. The lamps are connected directly to the terminals of the battery without the interposition of any controlling resistance or regulating coils, solenoids, etc., thus eliminating the drop between the battery and lamps which is often found in other systems.

The method of control involved in this system is ideal for battery operation, eliminating all gassing charging, and at the same time recharging the battery rapidly after every discharge. Unnecessary overcharge is avoided and conditions adapted to secure the maximum life of the plates are maintained. Decomposition of the electrolyte in the cells by excessive gassing is prevented, thus reducing to a marked extent the amount of attention required for filling the cells with water from time to time.

When the car is standing there is no discharge whatever from the battery for the excitation of so called teaser coils, or for any other purpose, provided the lights are turned off. The equipment can, therefore, stand for many weeks without the battery losing its charge and can, therefore, be put into service immediately after such a period of idleness without further attention.

The first of these equipments to be put into actual service was installed on a car of one of the western trunk lines in November, 1912, and has been in continuous service ever since. As a result of the operation of this equipment the railway company in question has ordered 62 equipments of this type which are now about to be put into service. During the year of operation of the original equipment there has been no light failure or delay to car service on account of axle lighting equipment, no repairs to dynamo (except replacing of a defective ball bearing; these bearings being smaller than present standard), no removal of dynamo from car, no charging of battery, except that given by axle-dynamo en route, and no change in adjustment of controlling apparatus.

For purpose of test, the battery was completely discharged before leaving Chicago, January 9, 1913, and returned January 12, 1913, practically full, no change having been made in adjustment of controlling apparatus.

Water was added to the cells on the following dates only: November 19, 1912; December 31, 1912; January 15, 1913; August 12, 1913.

NEWS NOTES

ILLUMINATION.

ALAMEDA, CAL.—The electricity commission has decided to install electroliers along Webster street.

SEATTLE, WASH.—The city of Seattle has applied to the county commissioners for a franchise to furnish light and power between Seattle and Auburn.

ALBANY, ORE.—G. W. Hollister, representing Albers Bros. of Portland, was here recently for the purpose of investigating the feasibility of installing a gas plant.

MARTINEZ, CAL.—S. Waldo Coleman has applied to the railroad commission for a certificate of public convenience and necessity to construct and lay down gas mains in Contra Costa county.

HUNTINGTON BEACH, CAL.—The West Coast Gas, Light & Fuel Company has been ordered by the railroad commission to install an additional gas generating unit of at least 10,000 cu. ft. capacity.

PASADENA, CAL.—The commission has granted a certificate of public convenience and necessity to the Los Angeles Gas & Electric Corporation to operate under franchises in South Pasadena.

BEAUMONT, CAL.—The Beaumont Gas & Power Company has applied for a franchise for electric light and power service for Beaumont. The application states that work will begin at once on the service.

NEWPORT BEACH, CAL.—The railroad commission denied the application of the West Coast Gas, Light & Fuel Company to raise its minimum rate of 50 cents to $1.00 per month during certain months in each year.

LOS ANGELES, CAL.—City Electrician R. H. Manahan reported to the board of public works that he is negotiating with the Los Angeles Railway Company on the matter of the cluster lights for temporary relief along the company's lines in outlying districts not properly lighted at the present time.

BREMERTON, WASH.—The city council voted against the proposed ordinance outlining the project of Gustave F. Rust of Colby, appearing for a group of promoters offering to build a light and power plant on the Hama Hama River. They offered to turn the plant over to the city at the end of three years for $350,000.

BELLINGHAM, WASH.—Manager L. R. Coffin of the Puget Sound Traction, Light & Power Company, announced that approximately $8,000 will be expended by the company in improving and modernizing the local gas plant. The work will consist of the construction of a high concrete foundation used in the supporting of the steel holder tank.

LOS ANGELES, CAL.—The board of public utilities expects to announce the natural gas rate immediately. The railroad commission has fixed the wholesale rate at Los Angeles City limits at 14 cents. The problem involves fixing a rate which will be correct for the mixture of natural with artificial gas, as the daily consumption of one of the companies has reached a peak of 19,000,000 cu. ft., and the natural gas supply is insufficient to meet the demand.

TRANSMISSION.

EL CENTRO, CAL.—After a topographical survey of the proposed high voltage transmission line from Banning to El Centro, Engineer R. W. Waterman in charge of the survey, began work from El Centro, and will lay out the exact route where wires and cables are to be put up. When the line is completed it will convey high voltage from the Sierra Power Company's station at Banning to important points in Imperial Valley, with El Centro as the chief distributing station.

LAKEPORT, CAL.—A demurrer of the Yolo Water & Power Company to the complaint in the injunction suit brought by Lake County to restrain the power company from locating on Clear Lake has been filed in the Superior Court. Superior Judge M. S. Sayre of this county is disqualified from hearing the case by reason of property interests. It is expected here the suit will be transferred to another county.

FRESNO, CAL.—The Stone & Webster Construction Company has practically completed operations at Big Creek, and within the next two weeks, it is expected that all the finishing touches will have been made. About 100 men are working there now preparing the company's equipment for shipment out of the mountains. These men are the last of 60,000 who were employed there at different times while the power plant of the Pacific Light & Power Company was under construction.

SACRAMENTO, CAL.—Electrical contracts aggregating $70,442 were awarded by the city commission in accordance with the recommendations of City Electrician G. Stanley Pearce. The Pacific Gas & Electric Company secured the contract for street lighting. The total cost of the lighting for the year will be $66,328. Park lighting will cost $538. The contract for the lighting of buildings, involving $2150, and for electrical power, involving $1431, went to the Great Western Power Company. The contracts went to the same companies for last year at about the same rates.

SALT LAKE CITY.—The completion of the high tension line of the Utah Power & Light Company from Grace, Idaho, to Salt Lake City was celebrated by the officers and employes of the Phoenix Construction Company by a banquet at the Hotel Utah. The dinner was given by J. D. Evans, vice-president and general manager; P. L. Pierce, superintendent of construction; Markham Cheever, chief engineer of the Utah Power & Light Company, and Dr. D. C. Budge, chief surgeon of the construction company. P. J. Moran, one of the directors of the Utah Power & Light Company, was also present as a guest.

TONOPAH, NEV.—The power site reserve recently created by the government in Boulder Canyon is the result of the project initiated here in 1909 by Henry Schmidt and Clement Mayes of Tonopah. The location is such that it can be relied upon to furnish an unfailing supply of energy for an indefinite period, as the watershed takes in the entire mountain country of western Utah and Colorado, where the snowfall always insures a large run-off. Boulder Canyon is the site of the former steamship landing, where freight was brought to Salt Lake and Nevada points in the '50s and the power project will revive what is probably the oldest town in the state. According to the preliminary investigation, it will require an expenditure of $1,900,000 to carry out the plans of the company to deliver electric power at Ely, Searchlight, Las Vegas and Eldorado Canyon, Nev., and Kingman and Chloride, Ariz. The distance to Ely is 240 miles. This is the greatest length of transmission line on the system. Kingman is only 40 miles away, in an air line, and that camp will be materially benefitted as the cost of power has always been a stumbling block to investments and development of local mines.

TRANSPORTATION.

LOS ANGELES, CAL.—The City Council has abandoned the stub end of Fifth street, by ordinance. This removes one of the last remaining obstacles to the immediate construction of a new depot in Los Angeles.

SAN DIEGO, CAL.—The railroad commission has ordered the Los Angeles & San Diego Beach Railway Company to ask the city council of San Diego for extension of the franchise on La Jolla line, then apply for authority to issue bonds to electrify the road.

LOS ANGELES, CAL.—The city council has directed the Pacific Electric Company to remove the center poles and replace same with span wires to carry the trolley wires on Sixteenth street, between Normandie avenue and Arlington avenue, as per ordinance requirements.

LOS ANGELES, CAL.—The Pacific Electric Railway is rapidly superseding steam trains for passenger service on many interurban lines contiguous to Los Angeles. The Southern Pacific has announced its withdrawal of all trains on the Riverside-San Bernardino line and the local lines from Los Angeles to Whittier, Long Beach and San Pedro.

OAKLAND, CAL.—The directors of the Oakland, Antioch & Eastern Railway Company have called a special meeting of stockholders on March 3 to vote on the proposition of increasing the bonded indebtedness of the corporation from $5,000,000 to $5,700,000, and to secure the payment of the additional $700,000 by pledge agreement upon a portion of the bonds heretofore issued.

OGDEN, UTAH.—Commencing with January 1st, the Ogden Rapid Transit Company has purchased power for the operation of their system from the Utah Power & Light Company and their substation on Washington avenue has been remodelled to receive this power. The total amount of power now required to operate the Ogden Rapid Transit Company's system, is approximately 2700 h.p. Power was previously furnished by the Utah Light & Railway Company.

IDAHO FALLS, IDAHO.—It is stated the public utilities commission of Idaho propose to investigate the conditions under which the promoters of an electric street railway line for this city will handle the proposition, as a result of differences which have arisen between the mayor and the promoters of the new line. The commission will determine the amount the promoters expect to receive from the sale of stock, the amount of money that they themselves propose to put into the system, and such other information as may be necessary to protect the public.

SAN FRANCISCO, CAL.—Plans for the extension of the Geary street municipal railroad to the Exposition grounds and other projected points have been announced. Work will begin as soon as possible on the enlargement of the car barns to accommodate 70 more cars, and bids for materials for new track will also be let. Deliveries of material are to begin as early as March 15th and last through until December 15th. The city engineer's plans call for the beginning of work on the various extensions as follows: Van Ness avenue, Chestnut street, April 15th; Potrero avenue, Columbus avenue, June 1st; Fort Mason, August 15th; Stockton street, California street, Church street, September 1st; reconstruction of Union street line, August 1st. The various projects are to be completed all the way from the end of August to the end of January 1915. In this way all projected extensions, reconstruction and enlargements will be completed in plenty of time for the Exposition.

TELEPHONE AND TELEGRAPH.

VENICE, CAL.—The Sunset Telephone Company has agreed to extend its line to Kay Bee camp, in San Ynez canyon. Work is expected to start at once.

EL CENTRO, CAL.—The Imperial Telephone Company will begin construction of a line to Bernice within the next few days, the material already being on the ground.

EAGLE ROCK, CAL.—The railroad commission has granted the Pacific Telephone & Telegraph Company a certificate of public convenience and necessity for operation here.

RIVERSIDE, CAL.—S. D. Kamrar has applied for a certificate of public convenience and necessity to construct a telephone system into the section surrounding Blythe, Riverside county.

MODESTO, CAL.—The Pacific Telephone & Telegraph Company has filed its answer to the complaint of a number of patrons of farmer line telephones in the vicinity of Modesto. The telephone company denies that its rates of service are discriminatory or excessive.

WATERWORKS.

RENO, NEV.—After deliberation lasting since last October, the city council has voted against the adoption of the Frisch ordinance of the Galena creek water proposition.

LOS ANGELES, CAL.—City water service for Lassell Park, Washington Park, Elliott Place and contiguous territory has been assured by the action of the water board, Engineer Mulholland having been instructed to bring in plans for taking over the service in all these localities.

TUCSON, ARIZ.—Bids will be received up to January 26th, by the common council of the city for issue of $165,000 of water improvement bonds. Bonds will be dated January 2, 1914; shall bear interest at 5 per cent per annum. payable semi-annually; will be of denomination of $500 each, and shall run 30 years from date of issue.

ST. JOHNS, ORE.—A petition signed by 92 residents was submitted to the council at a recent meeting asking the council to take steps to construct a municipal water plant with Bull Run water as a supply. According to the petition the council is asked to take steps to lay water mains in the streets of St. Johns and secure from Portland a supply of Bull Run water.

SALEM, ORE.—Pronouncing the water service provided by the Coos Bay Water Company for the cities of Marshfield and North Bend inadequate, the state railroad commission has issued an order directing the company to increase the capacity of its reservoirs and its mains by August 1, 1914. The commission ordered the construction of a reservoir or 1,000,000 gallons capacity, also a 14 in. main to the distributing system in Marshfield, and enlarged mains in the cities themselves.

NILES, CAL.—The election called by the supervisors of Alameda county for the formation of an Alameda County Water District, to comprise sections of Washington Township, including Niles, Centerville, Irvington, Newark, Decoto and portions of Alvarado, resulted in a victory for the district. The purpose of the election was to provide a means of protecting the water supply of that section. Under the water-district plan, a board of directors may be appointed and endowed with authority to take the necessary legal steps to protect the water systems of the municipalities within the district. A further extension of the same plan allows the district to formulate and put into execution an independent water supply sytsem.

SAN FRANCISCO, CAL.—The condemnation suit of the city and county of San Francisco against the Spring Valley Water Company was begun last week in the Superior Court. This is said to be the most important condemnation suit ever instituted. The amount and value of the properties to be taken breaks all records of litigation of this character. All of the judges who are to sit in this case will come from counties outside of the Appellate Court district, of which San Francisco forms part. At least one of the three is to come from the southern section of the state, it is said, while one or two will be from the northern or the central part of California. Attorney Haven says that, while the suit will be brought to trial as soon as possible, it will take from three to six months to prepare for the hearing, and the taking of evidence may not be commenced until about the middle of the year.

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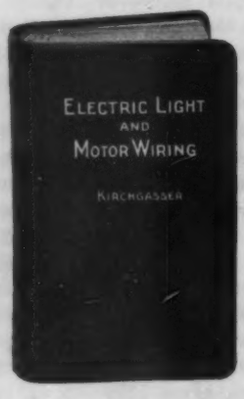

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